

Gravatt, Dan

From: Paul Rosasco <paulrosasco@emsidenver.com>
Sent: Thursday, October 31, 2013 4:07 PM
To: Gravatt, Dan; 'Muenks, Shawn'
Cc: 'Merrigan, Jessie (LG)'; 'Charlotte L. Neitzel'; 'Kate Whitby'; 'Victoria Warren';
steven.golian@em.doe.gov; 'Steve Miller'; 'Christina Richmond'; 'Dan Feezor'; 'Mike
Bollenbacher'; 'Bob Jelinek'
Subject: Revised Work Plans - Additional SFS Evaluations
Attachments: Work Plan- Alternative Area 2 RIM Volume REVISED 10-28-13.pdf; Transmittal - Revised WP
Area 2 RIM Volume 10-28-13.pdf; Revised Work Plan - Apatite Technology 10-31-13.pdf;
Transmittal - Revised WP Apatite 10-31-13.pdf; Work Plan - Discount Rate REVISED
10-28-13.pdf; Transmittal - Revised WP Discount Rate 10-28-13.pdf

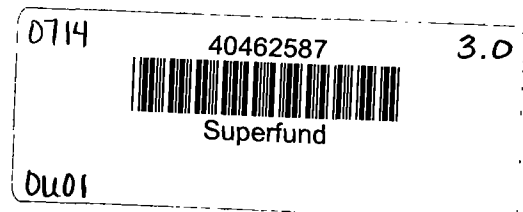
Dan,

Attached please find revised Work Plans for

1. Alternative Area 2 RIM Volume;
2. Evaluation of Apatite Treatment Technology; and
3. Additional Discount Rate evaluations.

Also attached are transmittal letters for each work plan that identify substantive comments that are not specifically addressed in the work plans.

If you have any questions about these work plans or transmittal letters, please do not hesitate to contact me.



ENGINEERING MANAGEMENT SUPPORT INC.

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October 28, 2013

VIA: Electronic Mail

U.S. Environmental Protection Agency
Region VII SUPR/MOKS
11201 Renner Boulevard
Lenexa, KS 66219

ATTENTION: Mr. Dan Gravatt

SUBJECT: Revised Work Plan – Alternative Area 2 Excavation Depths and Volumes, West Lake Landfill Operable Unit 1, Bridgeton, Missouri

Dear Mr. Gravatt,

On behalf of Cotter Corporation (N.S.L.), Bridgeton Landfill, LLC., Rock Road Industries, Inc., and the United States Department of Energy (the "Respondents"), Engineering Management Support Inc. (EMSI) submits the attached revised Work Plan – Alternative Area 2 Excavation Depths and Volumes. The attached work plan has been revised to address comments provided by EPA's National Remedy Review Board (NRRB) and by the Missouri Department of Natural Resources regarding the specific sections of the Supplemental Feasibility Study (SFS) report that may need to be revised to incorporate the results of the evaluations of the alternative depths and volume of radiologically-impacted material (RIM) in Area 2.

With regard to the comment that "...the 500,000 cubic yards amount corresponding to the 'complete rad removal' option likely overstates the volume and cost associated with a reasonable excavation remedy, especially where it appears feasible to separate out uncontaminated overburden material (e.g., construction debris)," we do not understand the basis or nature of the NRRB comment. The volume of RIM identified in Areas 1 and 2 for possible excavation under the "complete rad removal" is actually 335,500 bank cubic yards (bcy) (see Section 2.2.4 of the December 2011 SFS report). The SFS evaluations also identified 359,000 bcy of non-RIM overburden material (including both non-RIM solid waste and inert fill material) located over the RIM in Areas 1 and 2 that would need to be removed and segregated as part of any attempt to remove the underlying RIM.

The methods used to develop these volume estimates for both RIM and overburden were discussed with EPA during a webinar meeting prior to preparation of the SFS, and were subject to EPA review and approval during development of the draft and final SFS report. We do not understand the basis for the value of 500,000 cubic yards cited by the NRRB

or the apparent misunderstanding of the NRRB regarding the fact the prior SFS evaluations included separation of non-RIM overburden material from the volumes of RIM to be excavated and disposed elsewhere.

With respect to the comments provided by the NRRB regarding consistency of the evaluation of alternative Area 2 RIM depths and volume with comments and recommendations provided by the NRRB, we look to EPA Region VII to address these comments with the NRRB. The Work Plan previously provided to EPA and the attached revised Work Plan address EPA's request (as stated in EPA's October 12, 2012 letter to the Respondents) that the volume of RIM considered for possible excavation under the "complete rad removal" alternatives be revised to exclude deeper intervals in soil borings WL-210 and WL-235 in Area 2. With respect to consideration of other alternative volumes of RIM for examination of possible excavation, this activity is addressed in the separate Work Plan – Partial Excavation Alternative.

If you have any questions or desire additional information related to this work plan or any other aspect of the project, please do not hesitate to contact me.

Sincerely,
ENGINEERING MANAGEMENT SUPPORT, Inc.



Paul V. Rosasco, P.E.

Distribution:

Shawn Muenks - Missouri Dept of Natural Resources
Victoria Warren - Republic Services, Inc.
Ward Herst - Herst & Associates, Inc.
Jessie Merrigan - Lathrop & Gage
Bill Beck - Lathrop & Gage
Charlotte Neitzel - Bryan Cave HRO
Steve Golian - U. S. Department of Energy
Steven Miller - U. S. Department of Energy
Christina Richmond - U.S. Department of Justice
Dan Feezor - Feezor Engineering
Mike Bollenbacher - Auxier & Associates

Work Plan

Alternative Area 2 Excavation Depths and Volumes

Introduction

EPA's October 12, 2012 letter to the West Lake Landfill Operable Unit 1 (OU-1) Respondents states that, during an early consultation with the National Remedy Review Board (NRRB), the NRRB indicated that the deeper radiological detections in borings WL-210 and WL-235 are unreliable. Consequently, EPA has asked that the volume of radiologically-impacted material (RIM) considered for possible excavation under the "complete rad removal" alternatives be revised to exclude deeper intervals in soil borings WL-210 and WL-235 in Area 2.

Evaluation of the soil sample analytical results and the downhole gamma logging data during preparation of the SFS indicated that soil containing radionuclides above the levels used to identify material to be included within the scope of the two "complete rad removal" alternatives was potentially present within a deeper depth interval beneath the southwestern portion of Area 2. Specifically, elevated gamma peaks were identified on the downhole gamma logs at depths of 47.5 feet (ft) below ground surface (bgs) in WL-210 and 22.5 ft bgs in WL-235; however, the Remedial Investigation (RI) [EMSI, 2000] states (on p. 97) that boring WL-210 was re-logged because during the first logging attempt, material was knocked into the hole and that the presence of this material may have been the cause of a small poorly defined peak at the bottom of this boring. The RI also states (again on p. 97) that the presence of a poorly defined peak at the bottom of WL-235 may also be the result of RIM at shallow depths having been knocked into this borehole during drilling or logging activities.

Although the RI raised possible questions about the representativeness of the downhole gamma logs for the deeper intervals of these two borings, a soil sample obtained from boring WL-210 detected the presence of total Thorium-230+232 at a depth of 40 ft bgs at a level (18.6 pCi/g) above the cleanup level (7.9 pCi/g) used to evaluate potential excavation alternatives. A duplicate sample obtained from this same depth interval contained total thorium at 11.6 pCi/g. These samples were obtained from a depth of 40 ft, 10 feet above the bottom of the borehole. In addition, these samples were obtained during drilling of the borehole, prior to the downhole logging activities that may have resulted in surficial material being knocked into the hole. Therefore, these sample results likely represent actual conditions at the 40 ft depth interval in boring WL-210. The RI sampling did not include collection of a soil sample from the deeper portion of the WL-235.

Although uncertainty exists regarding the representativeness of the downhole gamma logs at these two locations, the soil sample result from the 40 ft depth in WL-210 combined with the downhole gamma logs were used to define an area and volume of a deeper interval of RIM occurrence beneath the southwestern portion of Area 2. This material and the associated overburden material that would need to be removed to allow for excavation of this RIM, were included within the overall volumes of materials

that would need to be excavated if one of the “complete rad removal” alternatives were to be implemented at the site. (Note: Deeper intervals of radiologically-impacted material were also identified beneath other portions of Area 2 but are not the subject of this re-evaluation).

Because of the uncertainty associated with the downhole gamma logging at these two locations, EPA has indicated that the NRRB believes the radiological detections in the deeper portions of these two borings are unreliable. EPA has therefore requested that the volumes of materials that may be removed under a “complete rad removal” alternative be re-estimated to exclude the deeper depth intervals in borings WL-210 and WL-235.

Approach

The following approach will be used to develop a revised excavation volume for Area 2:

1. Revise the calculated volume of material to be excavated under the “complete rad removal” alternatives to eliminate deeper intervals in soil borings WL-210 and WL-235 and consequently to eliminate removal of the deeper interval of RIM material from the southwestern portion of Area 2; and
2. Develop revised estimates of the potential risks to workers and the public, revised projected construction schedules, and revised cost estimates for excavation and offsite or onsite disposal based on exclusion of the potential deeper occurrences of RIM beneath the southwestern portion of Area 2.

Deliverables

The following deliverables will be prepared pursuant to this task

1. Interim Deliverable – A brief memorandum will be prepared summarizing the revisions to the RIM extent and volumes resulting from exclusion of the deeper interval beneath the southwestern portion of Area 2. If the re-evaluation of the volume material results in significant changes in the amounts of materials that would be excavated under the “complete rad removal” alternatives, this memorandum will also include evaluations of potential risks, revised calculations of greenhouse gas emissions, revised anticipated project schedules, and revised anticipated costs for the two “complete rad removal” alternatives based on the assumption that the deeper intervals in borings WL-210 and WL-235 are not included in the volume of RIM material under the two “complete rad removal” alternatives.
2. SFS Revisions – The existing SFS text, tables and appendices will be amended to include the results of alternative development and evaluation based on exclusion of the deeper intervals in

borings WL-210 and 235 in conjunction with the existing discussions that include these depth intervals as presented in the current SFS report. Subject to EPA comments on the Interim Deliverable, the following specific revisions to the December 2011 SFS report are anticipated:

- a. Amend the text of the SFS as follows:
 - i. Section 2.2.4 – Include discussion of the revisions/changes to the volume of RIM addressed by this alternative.
 - ii. Section 5.3.1 – Include as part of the descriptions of the excavation and disposal alternatives the volumes of RIM and overburden material to be excavated if the reported deeper occurrences in borings WL-210 and WL-235 are not considered in addition to the total volumes already presented in this section
 - iii. Sections 6.2.2 and 6.2.3 – Include as part of the descriptions of the excavation and disposal alternatives the volumes of RIM and overburden material to be excavated if the reported deeper occurrences in borings WL-210 and WL-235 are not considered in addition to the total volumes already presented in this section
 - iv. Sections 6.2.2.5 and 6.2.3.5 – Add to the discussions of Short-Term Effectiveness, in particular the Protection of the Community, Protection of Workers, and Time Until RAOs are Achieved, discussions relative to the reduced volume of material and consequently reduced time frames that would be associated with excavation and disposal alternatives if the reported deeper occurrences in borings WL-210 and WL-235 are not considered
 - v. Sections 6.2.2.7 and 6.2.3.7 – Add to the discussion of Cost, the estimated costs to implement the excavation and disposal alternatives based on the reduced volume of material and consequently reduced time frames that would be associated with excavation and disposal alternatives if the reported deeper occurrences in borings WL-210 and WL-235 are not considered
 - vi. Sections 7.2.3 (Short Term Effectiveness) and 7.2.5 (Cost) – Revise the comparative analysis of alternatives to reflect the differences between the short-term risks, schedules and costs that result from inclusion or exclusion of the deeper intervals in borings WL-210 and WL-235
 - vii. Table 10 – Amend this Table to include the results of the evaluation of the revised Area 2 volume alternative.
- b. Amend the Appendices to the SFS as follows:
 - i. Appendix B – Develop and include an alternative excavation plan that does not include excavation of the deeper intervals at WL-210 and WL-235 and calculate the revised volume of RIM and overburden material to be excavated.
 - ii. Appendix H – Develop and include estimates of the potential risks to the community and workers based on the volumes of RIM and overburden material

to be excavated and revised construction schedules if the deeper intervals in borings WL-210 and WL-235 are not considered

- iii. Appendix I – Prepare additional estimates of Greenhouse Gas Emissions associated with the “complete rad removal” alternatives under a scenario where the deeper intervals in borings WL-210 and WL-235 are not considered
- iv. Appendix J – Prepare additional construction schedules for the “complete rad removal” alternatives under a scenario where the deeper intervals in borings WL-210 and WL-235 are not considered
- v. Appendix J – Prepare additional estimates of the construction costs (both fiscally constrained and not-fiscally constrained) for the “complete rad removal” alternatives under a scenario where the deeper intervals in borings WL-210 and WL-235 are not considered

Changes may also be made to other sections of the report if and as necessary to reflect the results of the evaluations of the revised Area 2 depth and volume estimates including but not limited to changes to the evaluation of the implementability of the alternatives.

Clarifications by EPA

No additional information or clarifications are being requested from EPA at this time relative to this task.

Anticipated Schedule

It is anticipated that it will take approximately two months to develop the interim summary memorandum.

Preparation of a Supplemental SFS report that includes the results of the revised Area 2 excavation volumes and associated evaluations, as described in the interim deliverable summary memorandum, will be performed once EPA comments on the interim deliverable are received and in conjunction with revisions to the existing SFS report required to address the results of the various other additional tasks EPA has requested.

References

Engineering Management Support, Inc. (EMSI), 2011, Supplemental Feasibility Study, Radiologically-Impacted Material Excavation Alternative Analysis, West Lake Landfill Operable Unit-1, December 16.

EMSI, 2000, Remedial Investigation, West Lake Landfill Operable Unit-1, April 10.

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October 31, 2013

VIA: Electronic Mail

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Region VII SUPR/MOKS
11201 Renner Boulevard
Lenexa, KS 66219

ATTENTION: Mr. Dan Gravatt

**SUBJECT: Revised Work Plan – Evaluation of the Use of Apatite/Phosphate
Treatment Technologies, West Lake Landfill Operable Unit 1,
Bridgeton, Missouri**

Dear Mr. Gravatt,

On behalf of Cotter Corporation (N.S.L.), Bridgeton Landfill, LLC., Rock Road Industries, Inc., and the United States Department of Energy (the "Respondents"), Engineering Management Support Inc. (EMSI) submits the attached revised Work Plan – Evaluation of the Use of Apatite/Phosphate Treatment Technologies. The attached work plan has been revised to address comments provided by EPA's National Remedy Review Board (NRRB), the Missouri Department of Natural Resources (MDNR), and the United States Geological Survey (USGS), as appropriate and based, in part, on discussions held during the September 24, 2013 meeting in Kansas City.

With respect to the comments provided by the NRRB regarding evaluation of other technologies such as solidification and dry soil separation, these technologies were evaluated in the Supplemental Feasibility Study (SFS). We would direct the NRRB to review Sections 4.3.3.1, 4.3.3.3 and 4.4.1 of the December 2012 SFS report. The applicability of multiple scanning spectroscopic techniques to identify soil containing radionuclides is a function of the applicability of dry soil separation techniques. Inclusion of a solidified layer as part of the design of a new engineered landfill cover was determined to be inappropriate due to the potential impacts of settlement/consolidation of the underlying waste materials and resultant differential settlement and cracking of any rigid solidified layer (in contrast to the non-rigid more flexible nature of a low permeability soil layer) within a landfill cover system.

The NRRB also commented on sorting of overburden from the RIM to reduce the overall volume of material to be disposed on-site or off-site. In response, excavation, sorting and separation of non-RIM overburden material was evaluated and included as part of the

“complete rad removal” alternatives previously evaluated during the SFS. We would refer the NRRB to Sections 2.2.4, 5.3.1 and Appendix B of the December 2012 SFS report.

With respect to comments made by the NRRB and the USGS about the lack of technical literature regarding application of apatite/phosphate treatment to radium, we would concur. The lack of available information on the potential effectiveness, implementability and cost of such technologies for radium treatment is likely to be a significant consideration in evaluating such technologies for OU-1.

Relative to the NRRB comments regarding additional groundwater characterization, we would refer the NRRB to the ongoing additional groundwater sampling currently being completed at the site. EPA Region VII has also stated that any additions to the groundwater monitoring well network would be performed later in conjunction with remedial design activities at the site.

As indicated in the original and revised work plans, we still need to discuss the overall approach to the evaluation of apatite/phosphate-based treatment technologies with EPA prior to undertaking any evaluations. Such discussions can be held prior to finalization and EPA approval of the work plan or during the early stages of implementation of the work plan as part of an interactive process to perform the additional SFS evaluations.

If you have any questions or desire additional information related to this work plan or any other aspect of the project, please do not hesitate to contact us.

Sincerely,
ENGINEERING MANAGEMENT SUPPORT, Inc.

A handwritten signature in black ink, appearing to read 'P. Rosasco', with a stylized flourish extending from the end.

Paul V. Rosasco, P.E.

Distribution:

Shawn Muenks - Missouri Dept of Natural Resources
Victoria Warren - Republic Services, Inc.
Ward Herst - Herst & Associates, Inc.
Jessie Merrigan - Lathrop & Gage
Bill Beck - Lathrop & Gage
Charlotte Neitzel - Bryan Cave HRO
Steve Golian - U. S. Department of Energy
Steven Miller - U. S. Department of Energy
Christina Richmond - U.S. Department of Justice
Dan Feezor - Feezor Engineering
Mike Bollenbacher - Auxier & Associates

Work Plan

Evaluation of the Use of Apatite/Phosphate Treatment Technologies

Introduction

EPA's October 12, 2012 letter indicated that the National Remedy Review Board recommended that more detailed evaluations of potential treatment technologies be conducted as part of a Supplement to the Supplemental Feasibility Study [SFS] (EMSI, 2011). Consequently, EPA has asked the Respondents to evaluate the potential application of apatite and/or phosphate solutions for possible treatment of waste materials and/or groundwater. EPA requested that this evaluation be performed at a level of detail comparable to that used to evaluate the treatment technologies previously analyzed in the SFS.

Approach

Typically, the first step in the identification of potentially applicable remedial technologies is to evaluate general response actions that, based on site conditions and media of concern, could address the remedial action objectives (RAOs) at a site. The RAOs developed for OU-1 did not include direct treatment of the waste materials or treatment of groundwater. Consequently, potential remedial technologies related to these response actions were not evaluated in the FS (EMSI, 2006) or the SFS (EMSI, 2011). For purposes of conducting an evaluation of potential apatite/phosphate-based treatment technologies, this initial step, evaluation of general response actions based on site conditions and media of concern, will be skipped. Instead, to comply with EPA's direction, the evaluation will be based on a hypothetical scenario where treatment of the waste/source materials and/or treatment of groundwater have been deemed appropriate response actions relative to the site conditions and media of concern. In the event that apatite/phosphate-based treatment technology is determined to potentially be applicable to OU-1, it may be necessary to revisit the evaluation of general response actions and the identification of other potentially applicable remedial technologies.

Evaluation of the potential applicability of apatite or other phosphate-based treatment technologies for direct treatment of waste/source materials or for treatment of impacted groundwater will be performed using the same approach used to evaluate other potential remedial technologies under a Feasibility Study level-of-effort. The first step will be to identify potential apatite/phosphate-based treatment technologies and perform an initial screening of the technical implementability of such technologies relative to the waste and site conditions. The anticipated approach to the evaluation of potential application of apatite/phosphate-based treatment technology will be based on the following:

1. Review of available published literature; and
2. Discussions with DOE individuals with knowledge of the use and applicability of apatite injection technology.

Subject to results of the initial evaluations, possible applications of apatite/phosphate-based technologies to West Lake Landfill OU-1 may include the following:

1. Injection into waste materials to reduce leaching of radionuclides; and/or
2. Use for treatment of radionuclide occurrences in groundwater.

If the initial evaluations of potential apatite/phosphate-based treatment technologies indicate that such technologies may potentially be applicable to the site and waste conditions in OU-1, these technologies will be subjected to further evaluations, including potential effectiveness, implementability, and cost, in accordance with the procedures prescribed in EPA's "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA" (EPA, 1988).

Results of Preliminary Evaluations

This section provides a summary of the results of initial evaluations completed prior to and during development of this Work Plan. An initial search of technical literature (see References section below) and initial discussions with DOE personnel familiar with the use of apatite-based technologies indicate the following relative to possible use of apatite/phosphate-based treatment technologies:

1. Injection of apatite solution has been successful in halting migration of strontium-90 in groundwater at Hanford;
2. Bench-scale testing at Oak Ridge has indicated that apatite may be effective in treating uranium and heavy metals in groundwater (this reportedly was to be followed up by a pilot-scale test but reports of the results of the pilot-scale testing, if performed, have not yet been located);
3. No reports or information have yet been identified relative to the use of apatite to treat waste/source materials or relative to possible source treatment within a solid waste matrix; and
4. DOE representatives indicated that because of the potential disruption in chemical equilibrium within the waste matrix, such an application could result in an increase in the leaching potential of radionuclides instead of the reduction which would be intended by such an application (Thompson and Wellman, 2012).

Based on the lack of prior use of this technology for source stabilization, and in particular the complete lack of application to a source material composed of municipal solid waste, significant uncertainty exists about the potential applicability, effectiveness and possible unintended consequences of using an apatite/phosphate-based treatment technology to attempt to reduce potential leaching of radionuclides from OU-1.

All published information identified to date relates to the treatment of select radionuclides and heavy metals in groundwater. Specifically, the only published information located so far about treatment of groundwater relates to the treatment of strontium, uranium and heavy metals. No information exists regarding the potential use of apatite or other phosphate-based treatments or radium or thorium in either waste/source materials or groundwater. A study of radium leaching from phosphate deposits in Florida indicated that although such deposits may reduce the solubility of radium, radium was still found to leachate from crystalline phosphate deposits over a relatively short period of time (Burnett, et al., 1988).

EPA previously determined that there is no unacceptable risk of groundwater contamination at the West Lake Landfill site. Specifically, the ROD contains the following conclusions:

1. *These (groundwater sampling) results are not indicative of on-site contaminant plumes, radial migration, or other forms of contiguous groundwater contamination that might be attributable to the landfill units being investigated. (ROD at p. 20)*
2. *The groundwater results show no evidence of significant leaching and migration of radionuclides from Areas 1 and 2. (ROD at p. 21)*
3. *Significant leaching and migration of radionuclides to perched water or groundwater have not occurred despite landfilled waste materials having been exposed to worst-case leaching conditions from surface water infiltration over a period of decades. (ROD at p. 21)*
4. *The lack of radionuclide contamination in groundwater at the Site is consistent with the relatively low solubility of most radionuclides in water and their affinity to adsorb onto the soil matrix. (ROD at p. 21)*
5. *This pathway for migration (groundwater flow to the river) is not considered significant under current conditions because the on-site impact to groundwater from the landfill units is so limited. (ROD at p. 21)*
6. *The fourth (remedial action) objective (collect and treat contaminated groundwater and leachate to contain any contaminant plume and prevent further migration from the source area) is not applicable because a plume of contaminated groundwater beneath or downgradient of the disposal areas has not been identified. (ROD at p. 30)*

Consequently, groundwater was not determined to be a media of concern (i.e., no plume of groundwater contamination exists), and treatment of groundwater was not identified as a potential response action for the site in the prior FS or SFS. Accordingly, groundwater treatment technologies were not evaluated in either the FS or SFS. Additional comprehensive groundwater sampling from all site wells (both OU-1, OU-2, and groundwater detection monitoring wells associated with the former permitted solid waste landfill) was performed in 2012 and 2013 to refresh data regarding the current

quality of groundwater at the site. The results of this monitoring will be reviewed to evaluate whether groundwater contamination originating from OU-1 has occurred and to verify the ROD determinations. The results of these additional groundwater monitoring activities will also be considered during the evaluation of possible apatite/phosphate-based treatment technologies and as appropriate for any other additional SFS evaluations requested by EPA.

Deliverables

1. Interim Deliverable – A brief memorandum will be prepared summarizing the results of the evaluation of potential applicability of apatite/phosphate-based treatment technologies to the waste materials and site conditions associated with OU-1. This interim deliverable will also include a recommendation relative to identification and evaluation of potential additional remedial alternatives that may be based on apatite/phosphate-based treatment technologies.
2. SFS revisions – Assuming that the evaluation of apatite/phosphate-based treatment technologies only entails evaluation of the potential applicability of this technology and does not result in development of new/additional remedial alternatives, the following revisions to the SFS report are anticipated:
 - a. Section 4 – Technology Screening to include evaluation of an apatite/phosphate-based treatment technology
 - i. Section 4.2 – identify an apatite/phosphate-based treatment technology as an additional technology to be evaluated in the SFS
 1. Note: May need to identify other possible groundwater treatment technologies and expand the SFS to include evaluation of these
 - ii. Section 4.3 – include a description of apatite/phosphate-based injection technology
 - iii. Section 4.4 – either:
 1. Identify an apatite/phosphate-based treatment technology as a technology that was screened out; or
 2. Evaluate the implementability of an apatite/phosphate-based treatment technology for either:
 - a. Chemical stabilization of radionuclides in the waste mass (subject to determining that information exists on possible use of an apatite/phosphate-based technology in this manner); or
 - b. For use as possible contingent action in the event that groundwater contamination occurs in the future.
 - iv. Figure 24 – Add evaluation of the technical implementability of an apatite/phosphate-based treatment technology (ies) to this figure.

- v. Figure 27 – Add evaluation of the anticipated effectiveness, implementability and cost of an apatite/phosphate-based treatment technology (ies).

In the event that an apatite/phosphate-based treatment technology is found to be potentially applicable based on the site and waste conditions, there may be a need to develop one or more additional remedial alternatives for detailed analysis in the Supplemental SFS report. Such an effort is not included with the scope of the evaluation of an apatite/phosphate-based treatment technology addressed by this Work Plan.

Clarifications by EPA Requested

EMSI requests clarification from EPA regarding EPA's expectations relative to potential application of apatite and/or phosphate treatment technologies at the site. To date, review of the technical literature and information from other sites has only resulted in identification of application of apatite/phosphate technology for treatment of groundwater. EMSI has not identified any technical literature discussing potential application of apatite and/or phosphate solutions as methods of treating waste/source materials. Therefore, EMSI requests any information EPA can provide regarding known or potential applications of such technologies for direct treatment of waste.

EMSI wants to discuss with EPA the possible role of apatite/phosphate-based or other groundwater treatment technologies relative to preparation of a Supplemental SFS report. These include the following:

1. How the SFS should address the lack of/minimal nature of impacts to groundwater relative to any evaluation of a potential apatite/phosphate-based treatment technology for groundwater given that:
 - a. Groundwater was not identified as a media of concern in the FS or SFS and therefore general response actions and remedial technologies for groundwater were not identified or evaluated in either document.
 - b. Groundwater treatment was not identified as being necessary (see above language from the ROD).
2. Evaluation of apatite/phosphate-based treatment as a possible contingent technology:
 - a. Apatite/phosphate-based treatment technology could be evaluated as a technology for possible use as a contingent action in the event that significant groundwater impacts arise in the future.
 - b. Would there be a need to evaluate other possible technologies that could possibly be used as contingent technologies in the event of future groundwater impacts?
3. Evaluation of apatite/phosphate-based treatment (or other contingent groundwater technologies) would be limited to identification and screening of technologies for possible

future contingent applications. This would not result in development or evaluation of a remedial alternative(s) for groundwater treatment.

4. Overall evaluation of apatite/phosphate-based treatment of groundwater is inconsistent with CERCLA FS guidance documents. Specifically, as groundwater was not identified as a media of concern, the FS and SFS did not identify, screen or evaluate technologies for groundwater treatment.
5. Obtain additional information that EPA may be aware of on prior applications and experience with apatite/phosphate-based treatment technology.

Schedule

It is anticipated that collecting available information on potential use of apatite/phosphate-based treatment technologies, screening of the potential implementability of such technologies to the waste materials and site conditions at OU-1, evaluating the potential effectiveness, implementability, and cost of such potential applications, if appropriate, and preparing a summary memorandum will take approximately six weeks after receipt of EPA clarifications to the items identified above.

Preparation of a Supplemental SFS report that includes the results of the evaluations of apatite/phosphate-based treatment technologies will be performed after EPA's comments on the interim deliverable are received and in conjunction with a comprehensive revision to the existing SFS report required to address the results of the various other additional tasks EPA has requested.

References

Engineering Management Support, Inc. (EMSI), 2011, Supplemental Feasibility Study, Radiologically-Impacted Material Excavation Alternative Analysis, West Lake Landfill Operable Unit-1, December 16.

EMSI, 2006, Feasibility Study, West Lake Landfill Operable Unit-1, May 8.

U.S. Environmental Protection Agency (EPA), 2008, Record of Decision – West Lake Landfill Site, Bridgeton Missouri, Operable Unit 1, May.

EPA, 1988, Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA – Interim Final, EPA 540/G-89/004, OSWER Directive 9355-3-01, October.

Technical References – Apatite/Phosphate-Based Treatment Technology

Bostick, William D., undated, Abstract – The Use of Apatite for Chemical Stabilization of Subsurface Contaminants: Phosphate-Induced Metals Stabilization (PIMS) for Remediation of Radionuclides and Heavy Metal Contaminants at DOE Sites, emp-13.

Department of Ecology, State of Washington, 2010, Focus on Blocking Strontium – All About Apatite, Publication 06-05-008, July.

Department of Ecology, State of Washington, undated, Cleaning Hanford's Groundwater, Ecology Publication #08-05-001.

Department of Ecology, State of Washington and United States Environmental Protection Agency, 2007, Considerations for Cleanup of the Hanford 200 Area National Priorities List Site, December.

Department of Ecology, State of Washington, undated, Apatite – Blocking strontium from reaching the Columbia River, <http://www.ecy.wa.gov/programs/nwp/apatite.htm>

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October 28, 2013

VIA: Electronic Mail

U.S. Environmental Protection Agency
Region VII SUPR/MOKS
11201 Renner Boulevard
Lenexa, KS 66219

ATTENTION: Mr. Dan Gravatt

**SUBJECT: Revised Work Plan – Additional Present Value Cost Estimates,
West Lake Landfill Operable Unit 1, Bridgeton, Missouri**

Dear Mr. Gravatt,

On behalf of Cotter Corporation (N.S.L.), Bridgeton Landfill, LLC., Rock Road Industries, Inc., and the United States Department of Energy (the "Respondents"), Engineering Management Support Inc. (EMSI) submits the attached revised Work Plan – Additional Present Value Cost Estimates. The attached work plan has been revised to address comments provided by the Missouri Department of Natural Resources regarding the reasons for including additional evaluations of the present value cost estimates.

With respect to the comments provided by the NRRB regarding consistency of the evaluation of additional present value cost estimates with comments and recommendations provided by the NRRB, we look to EPA Region VII to address these comments with the NRRB.

We request that EPA notify us of its approval of the attached work plan at your earliest convenience. If you have any questions or desire additional information related to this work plan or any other aspect of the project, please do not hesitate to contact me.

Sincerely,
ENGINEERING MANAGEMENT SUPPORT, Inc.

A handwritten signature in black ink, appearing to read 'P. Rosasco', with a stylized flourish extending to the right.

Paul V. Rosasco, P.E.

Distribution:

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Steven Miller - U. S. Department of Energy
Christina Richmond - U.S. Department of Justice
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Mike Bollenbacher - Auxier & Associates

Work Plan

Additional Present Value Cost Estimates

Introduction

The present value (also referred to as present worth) cost estimates presented in the Supplemental Feasibility Study [SFS] (EMSI, 2011) were based on the Office of Management and Budget (OMB) real discount rate of 2.3% (as of 12-2011). EPA's October 12, 2012 letter indicated that the National Remedy Review Board has recommended that present value calculations be performed using a 7% discount rate.

For reference, EPA guidance directs evaluation of alternatives using a 7% discount rate (NCP, OSWER Directives 9355.3-20 and 9355.0-75) for non-federally financed projects. EPA guidance allows for use of lower or higher discount rate than 7% for the FS present value analysis. EPA guidance also requires evaluation of alternatives for federally funded projects to be based on real discount rates found in OMB Circular A-94 (2.3% for 2011). Pursuant to EPA's request, the alternatives will be evaluated using a 7% discount rate. Given that the Department of Energy is a Respondent for OU-1 and therefore federal funds will be used to pay for a portion of any remedial actions that may be implemented at the site and because EPA previously requested that the cost of the alternatives be evaluated using a fiscally-constrained approach in the event that the remedial actions are implemented by EPA as a fund lead site (see EPA January 24, 2011 letter to the Respondents), the cost of the alternatives will also be evaluated using the OMB rate.

Approach

Pursuant to EPA's request, present value cost estimate calculations will be prepared based on both the current OMB rate and a 7% discount rate. Accordingly, the cost estimates presented in the SFS will be updated to include both discount rates as well as any additional estimates to be developed in conjunction with additional evaluations requested by EPA for a Supplemental SFS. The results of these additional estimates will be compared to previous estimates to determine the sensitivity of the cost estimates to the discount rate.

A narrative will also be prepared to explain why both rates are being used for the SFS. The narrative will present a discussion addressing why use of the OMB rate is more appropriate for the SFS based on the following factors:

1. Remedial action for West Lake Landfill OU-1 will be federally-funded (DOE) in part;
2. Fiscally-constrained approaches were identified to address possible Federal (Superfund) funding of the remedial actions; and

3. The likelihood of being able to obtain a 7% pre-tax return over the anticipated near-term period of remedy construction is remote.

Deliverables

Interim Deliverable – A brief memorandum will be prepared to present the present value cost estimates for the ROD-selected remedy and the two “complete rad removal” alternatives presented in the SFS based on the OMB rate included in the SFS and a 7% discount rate. Development of cost estimates to be performed in conjunction with the other additional evaluations requested by EPA will also include both the OMB rate and a 7% discount rate.

SFS revisions – the following revisions to the SFS report are anticipated as part of this additional evaluation:

1. Section 6.1.7.3 – Revise text to address use of both 7% discount rate and OMB rate
2. Sections 6.2.1.7, 6.2.2.7, and 6.2.3.7 – Revise the discussion of the present value costs of the alternatives to include both present values based on 7% and OMB discount rates
3. Section 7.2.5 – Revise discussion of present values to include values based on both 7% and OMB discount rates
4. Appendix K – Include present value calculations based on both 7% and OMB discount rates

Please note that at the time the Supplemental SFS is prepared, the present value cost estimates will be updated to reflect the then-current OMB rate, which may differ from the rate used in the SFS or in preparation of the various interim deliverables documenting the results of the additional evaluations requested by EPA.

Clarifications by EPA

No additional clarification is being requested from EPA at this time.

Schedule

Preparation of additional present value cost estimates for the ROD-selected remedy and the two “complete rad removal” alternatives and preparation of a brief summary memorandum of the results of these additional evaluations will take approximately three weeks. Preparation of present value costs associated with the other additional evaluations requested by EPA will be completed in accordance with the schedules for completion of these other evaluations.

Preparation of present value costs using both discount rates for the other evaluations requested by EPA will be performed once EPA comments on the interim deliverables, and in conjunction with preparation of a Supplemental SFS.

References

Engineering Management Support, Inc. (EMSI), 2011, Supplemental Feasibility Study, Radiologically-Impacted Material Excavation Alternative Analysis, West Lake Landfill Operable Unit-1, December 16.

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